Cumulative Bone Lead and Firearm Use associated with Suicidal Ideation and Depression in Veterans. ``

Christian Hoover, MPH[1, 2], Aaron Specht, PhD[2, 3], Katherine Beavis[4], Mu-Yin Chang[4], Camille Marquez[4], Gabrielle Hoover, PhD[4]

1 Brown University, Providence, RI
2 Harvard T.H. Chan School of Public Health, Boston, MA
3 Purdue University, West Lafayette, IN
4 Home Base, A Red Sox Foundation and Massachusetts General Hospital Program, Charlestown, MA, USA

Introduction:

Veterans and active-duty servicemembers are at great risk of lead exposure, depression, and suicidal ideation and are amongst the most armed sub-groups in the United States.

When examining completed suicides within this sub-group, the majority are committed via firearms. This is increasingly concerning given recent evidence linking firearm use with lead exposure.

Moreover, most research examining lead exposure utilizes blood lead, which is limited to a 35-day exposure window.

However, lead deposits in the bone and can be measured via portable X-Ray Fluorescence. This approach can capture up to 45 years of exposure history.

As such, we aim to understand the relationship between cumulative bone lead levels, depression and levels of suicidal ideation.
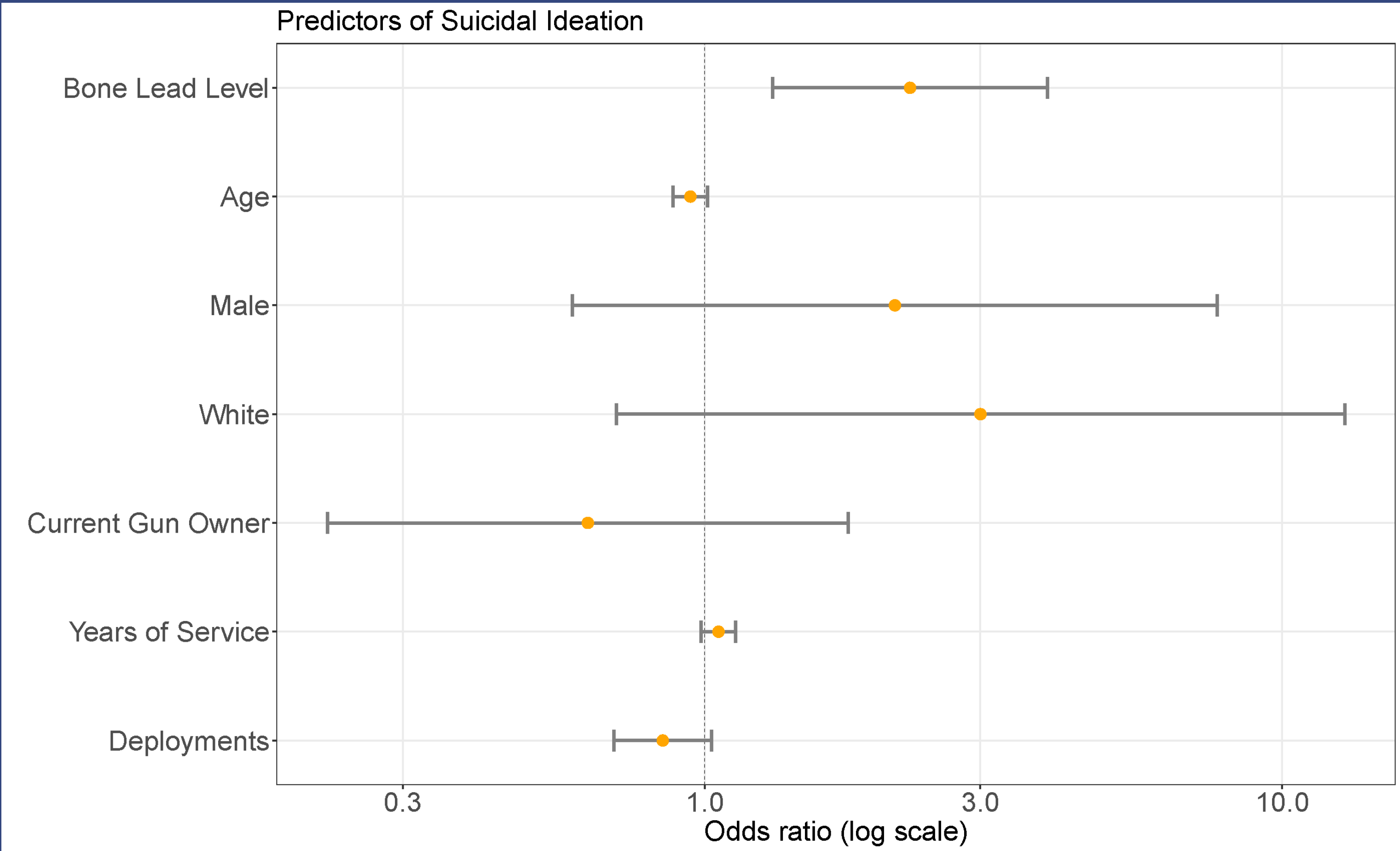
Methods:

Our sample was **78% Male and 89% White, 63% endorsed owning a firearm, and 30% endorsed some level of suicidal ideation (mild to severe).**
Depression was measured using the Patient Health Questionnaire (PHQ-9) and suicidality by item PHQ item 9 *("Thoughts that you would be better off dead, or of hurting yourself").* Bone lead was captured via 3-minute on-bone XRF scan.
All measured were taken at intake.
Our bone lead variable was highly skewed and log transformed for analysis.
Unadjusted and adjusted logistic and linear regression models were run examining the association between cumulative bone lead levels, suicidal ideation (PHQ-9 item 9 > 0) and level of depressive symptoms (PHQ-9 Total).

Predictors of Suicidal Ideation

Citations:

Poster Link:

Results:

Descriptives

	Median (IQR)	Mean, SD
		n = 124
Bone Lead	4.5 (5.4)	7.1 (9.4)
PHQ 9 (Depression)	13.5 (7)	13.6 (5.6)
Age	43 (10.3)	44 (8.8)
Years in Service	14 (15)	15.4 (9.0)
Number of Deployments	3 (5)	4.2 (4.2)

Logistic regression analysis of predictors of Suicidal Ideation.

	Suicidal Ideation	
	Unadjusted	Adjusted
	OR (95% CI)	OR (95% CI)
Bone Lead	1.6 (1.1, 2.7)	**2.2 (1.3, 4.0)**
Age		0.9 (0.9, 1.0)
Gender (Male)		2.7 (0.7, 10.6)
Race (White)		3.7 (0.9, 19.3)
Current Gun Owner		0.6 (0.2, 1.9)
Years in Service		**1.1 (1.0, 1.1)**
Number of Deployments		0.9 (0.7, 1.0)

Linear regression analysis of predictors of Depression.

	Depression	
	Unadjusted	Adjusted
	ß (95% CI)	ß (95% CI)
Bone Lead	0.5 (-0.6, 1.6)	**1.2 (0.2, 2.2)**
Age		**-0.1 (-0.2, -0.0)**
Gender (Male)		2.3 (-0.5, 5.0)
Race (White)		-1.2 (-3.7, 1.5)
Current Gun Owner		-0.1 (-2.3, 2.2)
Years in Service		-0.0 (-0.2, 0.1)
Number of Deployments		**-0.3 (-0.6, -0.07)**

Discussion:

In fully adjusted models, bone lead was significantly associated with depression and suicidal ideation. Individuals with high bone lead had 2.2 times the odds of endorsing suicidal ideation. Every log-unit change (ß) in bone lead saw a 1.2-unit change in symptoms of depression. Unadjusted analysis revealed negative confounding; the association between bone lead and depressive illness was more attenuated towards the null. Firearm use was not a significant predictor of depression or suicidal ideation in this partial sample, although its effect size suggests a lower odds (0.6).
A full sample (350 participants) will be necessary to more comprehensively evaluate these relationships.